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*Snow Surveyors Climbing to a Snow Course*

FEDERAL-STATE COOPERATIVE  
SNOW SURVEYS AND IRRIGATION WATER FORECASTS

for  
RIO GRANDE DRAINAGE BASIN

APRIL 1, 1946

By  
Division of Irrigation, Soil Conservation Service  
United States Department of Agriculture  
and  
Colorado Agricultural Experiment Station

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Data included in this report were obtained by the agencies named above in cooperation with the U. S. Forest Service, National Park Service, State Engineers of Colorado and New Mexico and other Federal, State and local organizations.



April 1, 1946

WATER SUPPLY OUTLOOK

RIO GRANDE

Irrigation water supply outlook for the Rio Grande, Chama, Pecos, and Canadian, for the coming season is discouraging at this time. Generally over the headwaters of these streams the water content of the snow is less than one-half of that a year ago and about 50 percent of normal. Reservoir storage has increased during March, but is much less than average for this season of the year in the San Luis Valley area. It is doubtful if the runoff will be sufficient to fill any of these reservoirs to capacity. Soil moisture is subnormal. Range and crop conditions are poor to fair.

RIO GRANDE: The present snow cover on the headwaters of the Rio Grande and its several tributary streams gives no promise of a favorable runoff this coming season. The recent snow surveys made on 24 courses on these watersheds show the average water content to be but one-third of that a year ago and less than one-half of the past 10-year average. At Wolf Creek Pass, Summitville and Cumbres Pass the water content averages about 12 inches in a snow depth of 46 inches. The density is approximately 25 percent which is much less than ordinarily found at this time of the season. On April 1, 1937 the water content of the snow on Wolf Creek Pass was 42 inches, likewise on Cumbres.

During March the snow depth at high elevations increased, which added some two inches of water during the month. There has been some improvement in the soil moisture during the past few weeks and is sufficient to start the small grain. There is little or no snow in the San Luis Valley. Farm lands and foothill areas are generally bare at this time. Stream flow is seasonably low, however nearly 5000 acre-feet reservoir storage has been realized during the past month. The total storage in the principal reservoirs of the Valley is now about 46,000 acre-feet. Last year at this time it was 72,500. Storage in the Elephant Butte and Caballo reservoirs, combined, totals 1,278,000 acre-feet which is 85 percent of that a year ago and slightly more than the past 10-year average.

The present outlook for an adequate irrigation water supply this coming season is not encouraging. The runoff will not likely approach normal stage and the peak will occur at an earlier date than usual, the flow receding markedly during early June. It is estimated that the runoff will be about 50 percent of normal. Water for irrigation during the latter part of the summer throughout the San Luis Valley and along the Rio Grande above Elephant Butte Reservoir will be short.

RIO CHAMA: Snow conditions on the headwaters of this stream, and tributaries, did not improve materially during March. The average water content of the snow cover is now about  $4\frac{1}{2}$  inches as compared with  $14\frac{1}{2}$  a year ago and is approximately  $\frac{1}{2}$  the 10-year normal. The runoff during the past month has been fairly good which gave more than 5000 acre-feet additional storage in El Vado Reservoir. This reservoir has now nearly 96,000 acre-feet in storage which will be a very substantial contribution to the needs for water this coming irrigation season. The runoff in this stream will be quite limited this coming summer and probably will not exceed 50 percent of normal. There will be some additional water for storage in El Vado during the snow melt period but not likely enough to fill the reservoir beyond 75 percent capacity. Additional snows may occur in the high mountains during April and May but because of the lateness of the season such accumulations will not add greatly to the late summer water supply.

PECOS: No improvement in the water supply outlook for this drainage occurred during the past month. As a matter of fact the average water content of the snow during March dropped nearly one inch. The light snow cover on the watershed of this stream will result in a short snow-melt season and will produce a relatively limited amount of water for irrigation. A shortage in supply can be definitely expected. The snow cover indicates that the runoff will be around 40 percent of normal.

#### CANADIAN

On the headwaters of this drainage the water content of the snow cover now averages only one-third of that a year ago and only one-half of the last 10-year average. Snow conditions generally throughout northern New Mexico are much below average for this time of year and not only the Canadian but all other streams heading in the mountain areas of this part of the State can expect a subnormal runoff this coming season. Because of the deficiency of snow and subnormal soil moisture the irrigation outlook at this time is not favorable. A runoff about 40 percent of normal is forecast. The snow-melt will not produce normal peak runoff and the stage of streams will recede rapidly during early June.



SNOW SURVEYS AND IRRIGATION WATER FORECASTS  
for  
RIO GRANDE BASIN

April 1, 1946

P R E C I P I T A T I O N    D A T A

WATERSHED	STATE	Precipitation October 1 to March 31	Departure from Normal	Precipitation March	Departure from Normal
Canadian	New Mexico	Inches 2.18	Inches -1.82	Inches 1.04	Inches +0.28
Rio Grande	Colorado	3.82	-1.94	1.38	+0.13
Rio Grande (N)	New Mexico	4.28	-2.22	1.39	+0.13
Rio Grande (S)	New Mexico	2.46	-1.33	0.28	-0.33
Pecos	New Mexico	3.49	-0.91	0.54	-0.21

Precipitation during March was below normal over the watersheds of the Pecos, and southern Rio Grande in New Mexico, but it was above normal over the watershed of the Canadian. The accumulated precipitation from October 1 to March 31 was, however, below normal throughout the area. There is a serious shortage in precipitation at this time over all the watersheds.

SUMMARY OF APRIL 1 SNOW SURVEYS AND COMPARISON OF DATA WITH THAT OF PREVIOUS  
YEARS BY WATERSHEDS

WATERSHED	Snow Depth		Water Content		Number courses in average	Snow Density			1946 Water Content in percent of	
	Ten Year Avg. *	1945	Ten Year Avg. *	1945	1946	Ten Year Avg. *	1945	1946	Ten Year Avg. *	1945
Rio Grande	In. 28.2	In. 37.2	In. 13.4	In. 9.0	In. 12.1	In. 3.9	24	32	43	32
Chama River	32.8	42.1	15.3	10.2	14.4	4.7	6	31	46	33
Pecos River	13.1	22.2	4.9	4.2	6.8	1.5	3	32	36	22
Canadian River	21.6	30.4	10.4	6.9	10.0	3.4	4	32	49	34

\* Some for shorter periods.

# RIO GRANDE WATERSHED

Summary of Federal and State Cooperative Snow Surveys  
Issued April 10, 1946, at Fort Collins, Colorado

Main Drainage and No. Snow Course	Local Drainage	State	Location Locality	Descrip- tion	Elev.	National Forest	Apr. 1 Snow Cover Measurements			
							Av. Snow Depth	Snow Depth	Av. Water Content	Water Content
							1945	1946	1945	1946
							In.	In.	Av. @	In.
<b>RIO GRANDE</b>										
26 Wolf Creek Pass	South Fork	Colo.	Wolf Cr. Pass	4-37N-2E	10000	Rio Grande	82.5	88.4	29.7	In.
27 Upper Rio Grande	Rio Grande	"	Rio Grande Res.	13-40N-4W	9350	"	21.7	21.7	5.6	33.4
47 Silver Lakes	Alamosa R.	"	1mi. S. Silver L.	15-36N-5E	9600	"	20.8	29.4	5.7	5.4
49 River Springs	Conejos R.	"	10mi. W. Mogote	25-33N-6E	9300	"	23.6	30.9	7.2	7.9
74 LaVeta Pass #2	SanCristo Cr.	"	LaVeta Pass	22-28S-70W	9300	SanCristoGr	25.8	33.4	7.7	10.2
76 Summitville	Wightman Cr.	"	Summitville	30-37N-4E	11500	Rio Grande	66.4	72.5	20.0	11.4
77 Cumbres Pass #2	Los Pinos R.	"	Cumbres Pass	17-32N-5E	10000	"	71.6	87.1	26.5	21.3
80 Santa Maria	N. Clear Cr.	"	Santa Maria Res.	8-41N-2W	9700	"	13.6	14.5	3.9	29.4
82 Culebra	Culebra R.	"	12mi. J. San Luis	37.2N105.2W	10000	SanCristoGr	34.1	50.0	10.4	3.4
84 Fort Garland	Big Ute Cr.	"	6mi. N. Ft. Garland	13-29N-72W	8200	"	10.1	13.2	3.4	12.7
										0.0
<b>RED RIVER</b>										
1 Red River	Red River	N. Mex.	6mi. SE. Red River	29-28N-15E	9500	Carson	25.7	41.4	9.0	16.0
2 Taos Canyon	Rio de Taos	"	14mi. E. Taos	10-25N-15E	9000	"	18.7	34.1	6.4	12.4
4 Aspen Grove	Rio En Medio	"	10mi. NE. Santa Fe	12-18N-10E	9100	Santa Fe	12.7	26.4	3.8	7.3
5 Lee Ranch	Jemez Cr.	"	5mi. NW. Bland	3-18N-4E	9050	"	24.4	34.7	7.8	9.7
6 Canjilon	Canjilon Cr.	"	8mi. NE. Canjilon	4-26N-6E	9500	Carson	53.5	66.6	12.1	26.5
9 Hematite Park*	Red River	"	3mi. SE. Red R.	8-28N-15E	9500	Carson	16.8	29.3	5.5	10.8
12 Tres Ritos	Agua Piedra	"	7mi. W. Holman	23-22N-13E	9000	"	16.7	29.2	5.3	9.5
15 Pay Role	Spring Creek	"	6mi. SE. Hopewell	23-28N-7E	9700	"	30.6	35.9	9.2	11.2
16 Jicarilla	Rock Lake Cr.	"	15mi. S. Dulce	9-29N-1W	8500	JicarillaR	5.4	9.6	1.7	2.3
17 Chama Divide	Willow Creek	"	6mi. W. Chama	36.9N106.7W	7750	OffForest	8.3	17.4	2.8	5.3
18 Chanita	Chanita Cr.	"	6mi. NW. Chama	36.9N106.7W	8500	"	26.9	36.0	8.7	11.4
19 Cordova	Cordova Canyon	"	2mi. W. Tres Ritos	22-22N-13E	10100	Carson	41.5	50.4	13.3	16.6
20 Panchuela #2*	Rio Nambu	"	2mi. N. Cowles	27-19N-12E	8300	Santa Fe	6.5	9.8	2.1	3.0
21 Big Tesuque	Big Tesuque Cr.	"	10mi. NE. Santa Fe	17-18N-11E	10000	"	20.1	30.4	6.7	10.2
							28.2	37.2	9.0	12.1
										3.9

\*On adjacent drainage  
@Average for period of record



RIO GRANDE WATERSHED

Summary of Federal and State Cooperative Snow Surveys  
Issued April 10, 1946, at Fort Collins, Colo.

Main Drainage and Course	Local Drainage	Location		Elev.	National Forest	Apr. 1 Snow Cover Measurements						
		State	Locality			tion	Av. Snow Depth	Av. Water Content	Av. Snow Depth	Av. Water Content	Av. Snow Depth	Av. Water Content
CHAMA RIVER	Pay Hole	N. Mex.	6mi. SE. Hopewell	23-28N-7E	9700	Carson	In. 30.6	In. 35.9	In. 14.5	In. 9.2	In. 11.2	In. 3.5
	Cumbres Pass #2	Colo.	Cumbres Pass	17-32N-5E	10000	Rio Grande	Av. 71.6	Av. 37.1	Av. 40.1	Av. 26.5	Av. 29.4	Av. 10.7
	Canjilon	N. Mex.	5mi. NE. Canjilon	4-26N-6E	9500	Carson	In. 53.5	In. 66.6	In. 30.6	In. 12.1	In. 26.5	In. 12.1
	Jicarilla	"	15mi. S. Dulce	9-29N-1W	8500	Jicarilla R.	In. 5.4	In. 9.6	In. 0.0	In. 1.7	In. 2.3	In. 0.0
	Chama Divide	"	6mi. W. Chama	36.9N-106.7W	7700	Off Forest	In. 8.8	In. 17.4	In. 0.0	In. 2.8	In. 5.4	In. 0.0
PECOS RIVER	Chamita	"	6mi. NW. Chama	36.9N-106.7W	8500	"	In. 26.9	In. 36.0	In. 6.3	In. 8.7	In. 11.8	In. 2.0
	Aspen Grove*	N. Mex.	10mi. NE. Santa Fe	12-18N-10E	9100	Santa Fe	In. 32.8	In. 42.1	In. 15.3	In. 10.2	In. 14.4	In. 4.7
	Panchuela #2	"	2mi. N. Cowles	27-19N-12E	8300	Santa Fe	In. 12.7	In. 26.4	In. 5.4	In. 3.8	In. 7.3	In. 1.4
	Big Tesuque*	"	10mi. NE. Santa Fe	17-18N-11E	10000	Santa Fe	In. 6.5	In. 9.8	In. 0.0	In. 2.1	In. 3.0	In. 0.0
				Average		for Drainage	In. 21.0	In. 30.4	In. 9.2	In. 6.7	In. 10.2	In. 3.1
CANADIAN RIVER	Hematite Park	N. Mex.	3mi. SE. Red R.	8-25N-15E	9500	Carson	In. 13.1	In. 22.2	In. 4.9	In. 4.2	In. 6.8	In. 1.5
	Ocate Mesa	"	3mi. E. Black L.	25-24N-16E	9200	Off Forest	In. 16.8	In. 29.3	In. 0.7	In. 5.5	In. 10.8	In. 0.3
	Tres Ritos*	"	7mi. W. Holman Hill	23-22N-13E	9000	Carson	In. 11.3	In. 12.8	In. 5.1	In. 3.5	In. 3.2	In. 1.3
	Cordova*	"	2mi. W. Tres Ritos	22-22N-13E	10100	"	In. 16.7	In. 29.2	In. 5.8	In. 5.3	In. 9.5	In. 2.1
				Average		for Drainage	In. 41.5	In. 50.4	In. 30.0	In. 13.3	In. 16.6	In. 10.0
							In. 21.6	In. 30.4	In. 10.4	In. 6.9	In. 10.0	In. 3.4

\*On adjacent drainage  
@Average for period of record



The following organizations cooperate in the snow surveys and irrigation water supply forecasts for the Colorado, Missouri-Arkansas and Rio Grande watersheds by furnishing funds or services.

STATE

Colorado State Engineer  
Wyoming State Engineer  
Utah State Engineer  
New Mexico State Engineer  
Montana State Engineer  
Nebraska State Engineer  
Colorado Experiment Station  
Colorado Extension Service  
Montana Experiment Station  
Utah Experiment Station

FEDERAL

Department of Agriculture  
Forest Service  
Soil Conservation Service  
Department of Interior  
Bureau of Reclamation  
Indian Service  
Geological Survey  
National Park Service  
Department of Commerce  
Weather Bureau  
War Department  
Army Engineer Corps

PUBLIC UTILITIES

Colorado Public Service Company  
Western Colorado Power Company  
Montana Power Company  
Denver and Rio Grande Western R. R. Company

MUNICIPALITIES

City of Bozeman  
City of Denver  
City of Boulder

WATER USERS ORGANIZATIONS

Poudre Valley Water Users' Association  
Arkansas Valley Ditch Association  
Colorado River Water Conservation District

IRRIGATION PROJECTS

Farmers Reservoir and Irrigation Company  
San Luis Valley Irrigation District  
Santa Maria Reservoir Company  
Costilla Land Company  
Uncompahgre Valley Water Users' Association  
Wyoming Development Company  
Goshen Irrigation District  
Kendrick Project  
Pathfinder Irrigation District  
Salt River Valley Water Users' Association  
San Carlos Irrigation and Drainage District

Many other organizations and individuals furnish valuable information for the snow survey reports. Their cooperation is gratefully acknowledged.

